BUREAU OF HIGHWAYS
REQUEST FOR PROPOSAL
for
QUALIFICATIONS BASED SELECTION FOR PREQUALIFIED SERVICES

The Michigan Department of Transportation (MDOT) is seeking professional surveying services for the projects contained in the attached scope of services.

If your firm is currently prequalified for this type of work and you are interested in providing services, please indicate your interest by submitting a Proposal. The Proposal must be submitted in accordance with the latest "Vendor Selection Guidelines for Service Contracts", available on the MDOT website. The maximum allowable pages for this Proposal is outlined in Exhibit F under the $25,000 to $100,000 category.

For efficiency sake, we are asking that the vendor firm provide **Four (4)** paper copies of the Proposal to the MDOT project manager named in the attached scope of services.

These copies must be received by **8:00 am on Tuesday December 14, 2004.** Fax and electronic copies are not acceptable.

In addition, provide one unbound copy to:

Regular Mail:
Secretary, Operations Contract Support
Michigan Department of Transportation
P.O. Box 30050
Lansing, MI 48909

OR

Overnight Mail:
Secretary, Operations Contract Support
Michigan Department of Transportation
425 W. Ottawa
Lansing, MI 48933

This copy is to be received within three working days after the due date and time specified above. Please do not deliver in person.

Any questions relative to the scope of services must be submitted by e-mail to the MDOT project manager. Any questions must be asked at least three working days prior to the due date and time specified above. All questions and their answers will be placed on the MDOT website as soon as possible after receipt of the questions. The names of vendors submitting questions will not be

disclosed.

For a cost plus fixed fee contract, the selected vendors must have a cost accounting system to support a cost plus fixed fee contract. This type of system has a job-order cost accounting system for the recording and accumulation of costs incurred under its contracts. Each project is assigned a job number so that costs may be segregated and accumulated in the vendor's job-order accounting system.

The selection team will review the information submitted and will select the firm considered most qualified to perform the professional surveying services based on the proposals. The selected vendor will be contacted to confirm capacity.

MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to apply. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal.

The scope of services is attached to this solicitation.

SCOPE OF WORK
for
PROFESSIONAL DESIGN SURVEY SERVICES

US-131 NB & SB from W. River Drive to 1,420 Ft. North of 10 Mile Road; Including Ramps

DATE: December 1, 2004

JOB NUMBER: 50758C
CONTROL SECTION: 41132

PREQUALIFICATION CATEGORY:

Road Design Survey PPMS Task 3330

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PARTICIPATION:

This Scope of Services has a 0% DBE qualification.

MDOT TEAM:

Any questions regarding this Scope of Professional Survey Services may be directed to the MDOT Project Manager:

Robert P.C. Zuzelski, PS
1420 Front St. NW
Grand Rapids, MI 49504
Office: 616.451.4098
E-Mail: ZuzelskiR@michigan.gov

DESCRIPTION OF WORK:

Provide professional surveying services for a proposed concrete overlay on mainline pavement, shoulders, and ramps along the above project limits. The work will include ditching and drainage modifications and miscellaneous safety upgrades. The survey will start at West River Drive and include the northbound on ramp and southbound off ramp to US-131 at West River Drive and continue North to 1,420 feet North of 10 Mile Road. The survey is to include mapping of all the ramps at Post Drive and 10 Mile Road. The survey limits will extend to the right-of-way on either side along the mainline and include the median, unless otherwise approved by the project manager. Survey limits along the on/off ramps should extend to the right-of-way on either side and terminate at the mainline pavement on the cross road or bridge.

Bridge underclearances specifying the minimum vertical distance between the bottom of bridge beam and the mainline line pavement, lane lines, edge of metal, and shoulder, will be required at each structure on

Pine Island Road, Post Drive, and 10 Mile Road. The intent of these underclearances is to provide the minimum vertical distance between the roadway and the structure above. Therefore, a thorough investigation should be conducted to insure that this minimum vertical distance is accurately reported.

The survey must include locations and elevations on all lane lines, edge of metal, edge of bit, shoulders, and break lines in the above project limits. Cross-sections should be taken at 50-foot intervals in the curves and 100-foot intervals along the tangents and strait sections.

Locate all permanent signs, guard rail and tree lines within the project limits. Locate all existing utilities including culvert pipe sizes, types, and inlet/outlet elevations. All major culverts must include a cross-section at the face of the culvert and another cross-section 50 feet away upstream and downstream on each side of the culvert.

Locate all section corners within the project limits and needed to establish the legal alignment for US-131 northbound and southbound. All government section corners in the project limits must be conspicuously described on the survey drawing and in the surveyor's report.

RTK GPS may be used for secondary horizontal control where as to supplement an existing primary control network provided the MDOT Real Time Kinematic (RTK) GPS standards are used and followed. RTK GPS may be used for mapping provided sufficient check measurements are taken frequently throughout the day, every day, to ensure that the survey accuracy is met according to the MDOT Survey Standards of Practice dated April 1, 1998. All check shots are to be stored in CAiCE as to serve as a permanent record. A RTK GPS check shot report is to be supplied in the mapping portion of the final project portfolio. A discussion between the Consultant Surveyor and the Grand Region Land Surveyor detailing the GPS methods and procedures proposed by the Consultant for this project must take place prior to beginning work.

This project may require additional survey pickup and utility/right-of-way staking to supplement the original Design Survey if the MDOT Design Engineer deems necessary. This miscellaneous survey pickup may or may not be needed and is contingent on the design needs for this project. Miscellaneous staking of utilities and right-of-ways may be needed to resolve conflicts or otherwise bring to light a potential conflict. The intent of this miscellaneous survey pickup and staking is to supplement the original Design Survey if and as needed to clarify questionable areas during the design process.

PROJECT TIMELINE:

Initial work authorization:	January 1, 2005
Initial survey drawing (digital) submittal CAiCE .zip, Plan.DGN, Triangle.DGN:	March 11, 2005
Final Design Survey portfolio and supporting documents as described in this scope	March 28, 2005
Miscellaneous survey pickup (if needed) Utility staking (if needed) Right-of-way staking (if needed)	November 30, 2006

NOTES:

The consultant surveyor shall discuss the scope of this survey with the MDOT Grand Region Land Surveyor before initiating any work on this project. A detailed Survey Work Plan with an estimate of hours by specific survey task such as control, leveling, mapping, etc. **must** be included in the project proposal.

It is the responsibility of the Professional Surveyor to safeguard all corners of the United States Public Land Survey System, published Geodetic Control and any other Property Controlling corners that may be in danger of being destroyed by the proposed construction project. These corners must be readily identified and detailed in the property section in the surveyor's report.

GENERAL REQUIREMENTS:

1. Surveys must meet all requirements of the Michigan Department of Transportation (MDOT) Survey Standards of Practice dated April 1, 1998. Please contact the Grand Region Design Survey office to clarify any specific questions regarding these standards.

2. Consultants must obtain all necessary permits, including an up-to-date permit from the MDOT Utilities Coordination and Permits Section, required to perform this survey on any public and/or private property.

3. Prior to surveying within the roadway, the consultant must contact the Regional Traffic and Safety Engineer or Transportation Service Center (TSC) about potential work restrictions regarding lane closures and work time limitations.

4. The consultant must adhere to all applicable OSHA and MIOSHA safety standards, including the appropriate traffic signs for the activities and conditions for this job.

5. Consultants are responsible for a comprehensive and conscientious research of all records essential for the completion of this project.

6. Surveys must comply with all Michigan law relative to land surveying.

7. Surveys must be done under the direct supervision of a Professional Surveyor licensed to practice in the State of Michigan.

8. Measurements, recorded data, and computations must be in INTERNATIONAL FEET.

9. Coordinate values shall be based upon the Michigan State Plane Coordinate System, South Zone (2113) (NAD 83) and referenced to the Michigan Spatial Reference Network. Elevations must be based upon the North American Vertical Datum of 1988 (NAVD 88).

10. Two complete sets of survey notes must be submitted to the Grand Region Design Survey Department in 10" by 12" divided portfolios with flap covers (Oxford Expanding Wallet #1373GL-OX or equivalent; size requirement facilitates storage in MDOT Record Center). Please use as many portfolios as needed to contain all of the required documents and diskettes. Note that different Survey Categories such as Road, Bridge, Hydraulic, etc. should be compiled

and submitted in separate portfolios. Data may be duplicated and shared among surveys, but the survey submittals should be self supporting as separate surveys and should not rely upon data in another survey.

11. Each portfolio must be labeled on the outside as per the following example:

    Survey Notes for:
    Location and Project Limits: [Project Name]
    Control Section [####] Job Number [#####] Date [of submittal]
    By [Name of Firm]
    Michigan Professional Surveyor [Name, PS]

12. Each portfolio is to be divided into six sections. These sections are to be labeled as follows: Administrative, Control, Alignment, Property, Mapping, and Miscellaneous. Below is a list of items to be included in the project portfolio, please refer to the deliverables section of this scope for additional detail.

    A. The Administrative section will include the following items:

    - A completed copy of the MDOT Form 222 entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL".
    - The original survey scope.
    - A comprehensive table of contents.
    - A complete synopsis (Project Report)of the survey that shall include, but not be limited to:
        - Horizontal and vertical control datum's used.
        - A discussion of government corners recovered, perpetuated or otherwise used as part of the survey.
        - Any problems encountered.

    - A statement of certification from the consultant surveyor supervising the project as to compliance with Michigan Department of Transportation (MDOT) Standards of Practice dated April 1, 1998.

    - As well as any documentation with respect to any project specific meetings and /or conversations with MDOT Survey personnel including an explanation of any deviation from the scope and Standards.

    - Also included in the administrative section shall be a copy of the Survey Project QA/QC Check-off list, a copy of which is included as Attachment "E" of this scope. This document shall be signed and certified by the Professional Surveyor responsible for the project. It is highly recommended that the consultant become familiar with this document prior to preparing the proposal and again prior to assembling the final portfolio. Failure to use and include this document shall result in the immediate return of the project portfolio for completion.

    B. The Alignment section will contain:

- A sketch of the alignment(s).
- A list of coordinates, witnesses and stationing of alignment points set or found, and PI's with deflection and curve data
- An explanation of how the alignment(s) were determined, whether best fit or legal, and all supporting documentation.
- Station, bearing and distance ties to Government Corners along the Section Line.
- A brief discussion of how the project stationing was determined. Stationing shall typically run from South to North or West to East.

This information must be submitted on printed 8.5" x 11" sheets as well as in ASCII electronic file format on Compact Disc (CD).

C. The Control section will contain:

Copies of the documents used to establish the horizontal and vertical reference systems for the project. This includes a thorough written explanation describing how the coordinate systems were established.
This section should also contain:

- Control traverse raw data, and least squares analysis for both horizontal and vertical control.
- A control point list that shall include horizontal datum, and, for each point, N,E,Elev, Desc. coordinates with standard error, four witnesses, station and offset and scale factors if appropriate.
- A complete Benchmark list with datum, elevation, description, and station and offset of each benchmark.

- A sketch of the control traverse, showing any ties (government corners, property, alignment, etc.) shall also be included in this section. This sketch may be combined with the alignment sketch.

This information must be submitted on printed 8.5" x 11" sheets as well as in ASCII electronic file format on Compact Disc (CD).

D. The Property section contains all information that is gathered regarding the real property affected by the project, and all necessary property ties. This will include:

- Copies of all recorded Land Corner Recordation Certificates for the government corners used, reestablished, or in danger of obliteration by impending road construction.
- Recorded plats, recorded certified surveys, tax maps and tax descriptions listing owners and addresses.

E. The Mapping section shall contain:

- All survey notes, research documents, and collected data used to produce the maps necessary for this project
- All plots and diskettes for topography.

- Utilities and drainage information.

NOTE: Hard copy of Radial Topographic coordinate data shall NOT be submitted.

F. The Miscellaneous section contains any information not included in the previous

13. All sheets in a portfolio must be marked with the control section, job number, section number and page number. CD's must be labeled with the control section, job number, data type and file names.

14. The following information is to be submitted on Compact Disc (CD):

    a. Text files, in ASCII format, containing the witness lists for the horizontal alignment ties, horizontal control points, bench marks, and government corners, as described herein.

    b. Any other text files are to be in either ASCII or RTF (Rich Text Format).

15. Documents are to be submitted as follows:

    a. All recorded instruments on 8.5" x 11" or 8.5" x 14" sheets as appropriate.
    b. All text files printed on 8.5" x 11" sheets.
    c. All recorded plats and condominiums on 18" x 24" sheets.
    d. All plots on 24" x 36" sheets.
    e. All documents and plots are to be legibly printed or reproduced on white paper.

16. The Consultant representative shall record and submit type-written minutes for all project related meetings to the MDOT Project Manager within two weeks of the meeting. The Consultant shall also distribute the minutes to all meeting attendees.

17. The MDOT Project Manager will be the official contact for the Consultant. The Consultant must either address, or send a copy of all correspondence to the MDOT Project Manager. The MDOT Project Manager shall be made aware of all communications regarding this project.

Any questions regarding to this project should be directed to Grand Region Land Surveyor.

At the completion of this survey, all original field survey notes, all electronic data, and all research records obtained for this project will be considered the property of MDOT and must be sent to: MDOT, Design Division, Supervising Land Surveyor, P.O. Box 30050, Lansing, MI 48909. Please use MDOT's Form 222 entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL" for all transmittals. NOTE: It is recommended that the project's horizontal and vertical control adjustments be submitted for review as soon as it is available.

MILESTONE PAYMENT SCHEDULE

Compensation for this Scope of Design Services shall be on a Lump Sum basis. Such Lump Sum compensation shall be divided into payments for the following portions of the services and in the following amounts:

Initial survey drawing (digital) submittal:	40%
Final Design Survey portfolio and supporting documents PPMS Task 3330:	50%
Miscellaneous survey pickup & staking, if needed:	10%
Total Reimbursement for services	100%

All Milestone Payment Percentages are negotiable except for the final Design Survey portfolio and supporting documents, PPMS Task 3330. The MDOT Project Manager may authorize payment if the milestone is delayed due to circumstances beyond the CONSULTANT'S control.

Definitions for Milestone Payment Schedule Items:

Initial survey drawing (digital) submittal - This payment milestone is considered complete and eligible for compensation when the initial survey drawing is received and approved by the MDOT Grand Region Land Surveyor.

Final Design Survey portfolio and supporting documents - This payment milestone is considered complete and eligible for compensation when the final Design Survey portfolio and supporting documents, PPMS Task 3330 is received and approved by the MDOT Grand Region Land Surveyor.

Miscellaneous pickup and staking, if needed - This payment milestone is considered complete and eligible for compensation when the miscellaneous survey pickup data or staking notes is received and approved by the MDOT Grand Region Land Surveyor.

MONTHLY PROGRESS REPORT

On the first day of each month, the Consultant shall submit a monthly project progress report to the parties listed below. The monthly progress report shall address the following items:

1. Work accomplished during the previous month.
2. Anticipated work and goals for the coming month.
3. Real problems which occurred during the month, and anticipated problems for the coming month.
4. Any updates on the project schedule including explanations for any delays or changes in schedule, scope, or work plan.
5. Any early reviews or submittals such as adjustments, computations, or alignment.

Robert P.C. Zuzelski, PS
1420 Front Ave. NW
Grand Rapids, MI 49504

Art Green, PE
1420 Front Ave. NW
Grand Rapids, MI 49504

FIELD SURVEY

The purpose of this field survey is to obtain information and/or data required by the project scoping engineer, to leave horizontal and vertical control in the field for future construction staking, and to provide a sufficient history of the area to enable the MDOT Design Survey Unit to perform dependable surveys in the future.

The field survey must include, but is not limited to, the following:

ALIGNMENT

A legal alignment must be established for this project. Establishing the plan centerline alignment determines the legal limit of the right-of-way as defined by and described from its centerline. Right-of-way plans, previous construction plans, existing monumentation, physical centerline both present and underlying, and other recorded information are to be used as guides to the proper location of the legal centerline. All evidence must be evaluated to determine the legal alignment. The method used to establish this alignment must be clearly explained in the surveyor's project report. All data used to determine the alignment, as well as a sketch of the alignment, must be included in the submitted survey notes. This alignment, with the stationing marked and labeled, is to be shown on the topographic map submitted for this project. All measured angles, distances, and curve data must also be reported where applicable. Alignments of all side streets must be tied to the project legal alignment.

At least two alignment control points must be found or set and witnessed on each tangent. These points must be intervisible and not be more than one kilometer apart. The alignment points may be set on an offset to the true alignment. If this is done, the witnesses must include the offset distance and the project surveyor must certify that the line is a true parallel offset. The project surveyor must provide a sufficient number of primary and intermediate control points to allow staking of the computed alignment without additional traversing by construction survey crews. The alignment notes must include the state plane coordinates and at least four witnesses for each alignment control point set or found.

The consultant must include a sketch or CADD drawing of the alignment in the portfolio, showing stationing, horizontal coordinates, curve data (Radius, External, Tangent length, PC station, PI station and PT station), alignment points found or set, and the basis from which the project stationing was determined

CONTROL

HORIZONTAL CONTROL

A three dimensional coordinate system must be established for this project. Upon request, the MDOT Design Survey Unit will supply descriptions of nearby published NGS control stations. Each NGS horizontal control station or bench mark used for this project shall require a complete history and a recovery description with new witnesses, in DDPROC format, which must be included in the final report submitted to the MDOT Design Survey Unit. The DDPROC program is available through the National Geodetic Advisor located in the MDOT Lansing Design Survey office. The requirement for NAD83 may be waived by request to Survey Project Manager.

The horizontal project control for this project will be classified as intermediate project control according to the MDOT Standards of Practice dated April 1, 1998. These control points are intended for mapping

and should be located outside the proposed construction area to insure their availability for all phases of construction. Each control point must be accurately described and witnessed to at least four nearby features. Please refer to MDOT Standards of Practice for the minimum requirements for these points.

A closed traverse must be run and adjusted between two or more known points on the project control traverse. Open traverses are NOT acceptable. Unadjusted traverse measurements must produce an error of closure of not greater than 1:20,000. Any permissible error of closure shall be distributed throughout the traverse by means of a suitable least squares adjustment software program. These points must not be set greater than 1320 ft nor less than 450 ft apart, semi-permanent in nature, and located outside the proposed construction area to insure their availability for all phases of construction. All data collection traverse points and the plan centerline alignment must be tied to the control established for this project.

All field observations, unadjusted traverse computations and final adjusted coordinates must be included in the notes. A list of all horizontal control points must be developed which includes datum, point designations, descriptions, horizontal coordinates with standard errors, station and offset, witnesses and appropriate scale factors. This list must be printed on 8.5" x 11" sheets and placed on CD in ASCII format. All data relating to the horizontal component of the system must be included in the control section of the portfolio.

VERTICAL CONTROL

The vertical component of this system must be based upon the North America Vertical Datum of 1988 (NAVD 88). Upon request, the MDOT Design Survey Unit will supply descriptions of nearby published NGS control bench marks. The requirement for NAVD88 may be waived by request to Survey Project Manager.

New bench marks must be set on massive structures outside the proposed construction area. Each bench mark must be accurately described and its horizontal position referenced by measurement from a horizontal control point and by station plus and offset from the alignment stationing.

Intermediate Vertical Control for project bench marks shall meet an unadjusted error of closure between known bench marks of not more than 12 millimeters times the square root of the distance between the marks in kilometers. Any error of closure must be distributed throughout the level runs by means of a suitable least squares adjustment software program. Open level loops are NOT acceptable.

The bench mark notes must include all field observations, the unadjusted loop closures and the final adjusted elevations. A bench mark list must be developed that includes datum, bench mark designations, descriptions, elevations, and station and offset (left or right) out from centerline. This bench mark list must be printed on 8.5"x 11 sheets and placed on CD, in ASCII format. All data relating to the vertical component of the system must be included in the control section of the portfolio.

The methods used to establish the horizontal and vertical components of the project coordinate control system must be fully discussed in the Surveyor's Project Report.

PROPERTY

GOVERNMENT CORNERS

Any Public Land Survey System (PLSS) corners within the project construction limits must be recovered or established and tied to the project coordinate system. Any PLSS corners needed to establish the alignment are required (IF legal centerline is required), as are any PLSS corners in danger of obliteration by impending road construction.

All PLSS corners must verified to the Professional Surveyor's satisfaction and recorded in accordance with PA 74 of 1970, as amended, and all applicable administrative rules. Four valid witnesses must exist in the field, or a new LCRC with four valid witnesses must be filed. All PLSS corners located in hard surface roads must be protected by a monument box, regardless of impending construction. It shall be the responsibility of the Project Surveyor to coordinate all such activities with the County Remonumentation Representative(s).

MAPPING

Project deliverables will include an Intergraph MicroStation (.DGN) format 2D planimetric map for the area within the mapping limits in both hardcopy and electronic format. A corresponding three dimensional MicroStation (.DGN) triangle file and Geopak (.XYZ) and (.OBS) files along with a fully edited CAiCE archive (.zip) file. These files must be created with the current MDOT English seed and cell files. Current MDOT symbology must be used exclusively as supplied in Appendix "F". Survey data shall be displayed, with the appropriate descriptive attributes, as noted in Appendix "B".

Mapping Scale: 1"=100'

The Consultant is encouraged to use the latest MDOT Tugboat to produce the final project deliverables.

The surveyor or CAiCE/CADD technician is expected to use due judgment in the event of necessary deviations from this standard. Survey chains (line items) will be processed and edited so as to be displayed as lines and smooth curves as appropriate and displayed at the requested scale with the appropriate pattern. All descriptive text shall be arranged such that text shall not overwrite each other. The delivered product should be legible and professional in appearance and portray an accurate representation of existing field conditions. As there are many variations in standard practices throughout the industry, it is recommended that the consultant refer to the attachments and the MDOT Design Division Plans Preparation Guidelines for additional information regarding such things as font size, display attributes, symbology, levels, etc., to be displayed in the submitted planimetric file. Questions or confusion should be immediately brought to the attention of the MDOT Project Manager for clarification.

Tree descriptions shall include species type and trunk diameter, in inches, 4 ft above the ground; Culvert type, size in inches and flowline elevation; Brush and wooded areas should be outlined and classified as to average size and density as noted in the attached appendix. Additional information that should be noted is surface materials, changes in surface materials, curb detail (profile type), ditch type (e.g. 2 ft round bottom), contours on the appropriate level and interval, building or mailbox addresses and other noteworthy items. This information may be included on the CADD file (on the proper level), or handwritten on a field verification plot. The plots will be submitted as described under the section of "Final Reports".

A Digital Terrain Model (DTM) will be created from the appropriate terrain data. This model will be created, using the CAICE terrain modeling format. It shall be checked for accuracy and edited as necessary to provide a true representation of the existing terrain. All triangles in the triangulation network that fall outside of the limits of this survey, or are deemed inappropriate in the judgment of the surveyor, are to be obscured so as to have no effect on cross-sections, contours and profiles developed from the model. These would include triangles which have legs so long as to cross areas that contain no survey data. Contours are to be generated from the Digital Terrain Model (DTM), to depict the site conditions for this project and plotted as noted above.

A statement, similar to the following, must be affixed to each sheet of all plots which certifies to the map's accuracy and signed and sealed by the project surveyor:

> I hereby certify that this map has been developed from survey data collected, and that accuracy standards are in accordance with the MDOT Design Survey Standards. This map correctly represents the existing conditions at the time the survey was completed.

All plots must be clearly defined and legible. An illegible plot will not be acceptable.

UTILITIES

All surface manifestations of utilities within the project area must be identified and their location tied to the project's horizontal coordinate system. A list of all utilities within the project limits must be submitted on CD as well as on a printed list. This list must include the feature name of each utility, its horizontal coordinates and elevation, and station and offset. A CAICE station and offset report will satisfy this requirement.

It may be necessary for the consultant to obtain as-built plans from each utility in the project area, and submit them with the name of utility, address, phone number, and contact person listed. Please check with the MDOT project Manager as to the necessity of this as this information may be available through MDOT.

DRAINAGE

The consulting firm is required to contact all local officials necessary to obtain all surface and subsurface drainage information regarding the project. The consultant must also ask the local officials about any known drainage problems within the project area and report their findings, as well as any observed drainage problems in a separate drainage report.

The following information is required for all surface and subsurface drainage:

- The type, size, condition, location, station, offset, surface and bottom or invert elevation of each drainage structure and culvert. This information must be printed on 8.5" x 11" sheets and submitted on CD in ASCII format.

- Descriptions of underground drainage structures shall include: description and type of structure, type of system (storm, sanitary, etc.), description or type of structure cover, size, type, invert elevation and direction of each pipe leading into or out of the structure.

- Culvert descriptions shall include size, type, invert elevation and end section treatment. Condition of culvert should include: horizontal and vertical misalignment, visible damage, rust, infiltration and amount by which it is filled with dirt and debris, if any.

- The location of all catch basins, manholes, and cross culverts must be shown on the topographic map. It may be necessary to prepare a separate plot to clearly show the surface drainage systems. Underground sanitary and storm systems must be mapped to show the connectivity of the structures. This may be added to the CADD file or hand sketched and submitted on a separate topographic plot made specifically for this purpose.

All plans and maps obtained from local officials are to be submitted as part of the final report. Information regarding any drainage problems from local officials, residents, or the consultant's observations must be documented in a separate drainage report.

This section will contain sections for all topography, elevations, surface/subsurface utility locations, and surface/subsurface drainage, including all cross culverts.

MISCELLANEOUS

Any information that would not be appropriately placed in the control, property or mapping sections should be included in this section. General photographs, local newspaper articles and project-related comments from residents are examples of miscellaneous data.

The surveyor must describe, in the final report, the data included in this section.

FINAL REPORT: <u>Two complete sets</u>

The final report for this project shall include the following:

In the first pocket of the portfolio(Administrative):

- MDOT's Form 222 entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL"

- MDOT QA/QC Check-off sheet, completed, signed and sealed.

- The project's Professional Surveyor's Report on company letterhead consisting of the following:

A comprehensive synopsis, signed by the project's Professional Surveyor, of the work performed on this project.

- The source and the methods used to establish the project horizontal control, elevations, alignment(s) and stationing for this project.

- A detailed explanation of anything discovered during the survey that may create a problem or be of interest to for the design engineer or another surveyor.

- MDOT authorization letter
- Copy of the scope of work
- Copy of proposed work schedule
- Any correspondence (change of scope, change of schedule, records of phone conversations, etc.)
- All Project files archived on 88.9 mm (3.5") HD Diskettes or Compact Disc (CD) including:
- **CAiCE archive (.zip) with digital terrain model (DTM) that has been appropriately edited and verified.**
- A MicroStation drawing file (.DGN). The format for the drawing file shall conform to all MDOT drafting standards pertaining to working units, global origin, features display, level assignments, standard line weights and colors, standard text assignments, standard fonts, and MDOT cell library assignments as listed in Attachments "AA, B, C, D".
- All required ASCII files or WordPerfect documents, reports, lists, etc.

In the second pocket (Control):

- Least squares adjustments for the horizontal and vertical control: GPS./traverse adjustment; level adjustment report showing mm error per km.
- Control Point witness list with datum, point number, coordinates with Std. Errors, witnesses, station-offsets and appropriate scale factors.
- Benchmark List with datum, descriptions, elevations, station-offsets.
- GPS./traverse adjusted coordinates with standard errors.
- Sketch or plot of network or traverse.
- NGS or MDOT data sheets of existing control and benchmarks
- DDPROC - .ha files printout

In the third pocket (Alignment):

- A sketch or CADD drawing of the alignment with stationing, horizontal coordinates, curve data, alignment points found or set, and a station equation to existing stationing in feet.
- Control sketch with control points, government corners and alignment plotted.

- A report discussing in detail how the alignment was determined.
- The witness list with description and coordinates for the alignment points found or set.

In the fourth pocket (Property):

- Copies of all LCRCs used for the project
- Government Corner list with Corner names, Coordinates and 4 witnesses. This list should clearly indicate which corners are in danger of destruction due to impending construction.
- Section Corner ties to the alignment with station, distance and bearing along the section line.
- Section map with bearings, distances between Government corners.
- Copy of submittals to county Remonumentation (if required)
- Copies of all research documents, tax maps, tax descriptions, deeds, recorded plats, surveys, etc.
- A separate plot of alignment showing all property irons found.
- A station-offset listing of property irons.

In the fifth pocket (Mapping):

- A legible planimetric plot, including contours, of this project on the required sheet size and utilizing the most recent MDOT Design Division Feature Codes and Cell Library. Please refer to "Attachment AA" for Feature Code display criteria. The centerline alignment(s) must be shown on this plot.
- A second planimetric plot that shall legibly show all surface materials, utility connectivity and other pertinent notes or comments.
- The consultant is responsible for verifying all plots by a field inspection. Each plotted sheet must have the statement specified in the Standards of Practice for MDOT Design Surveys dated April 1, 1998 affixed to it. Each sheet must also be signed and sealed by a resident Professional Surveyor licensed in the State of Michigan which certifies to the accuracy of the plots.
- All field survey notes, all electronic data, and all research records obtained for this project. It is not necessary to submit raw survey data in hardcopy form, electronic format will suffice.
- Drainage structure inventory that shall be correlated to the structures shown on the planimetric map and will include all pertinent data about the structures: Station and offset, coordinates, structure name, rim elevations, invert depths with corresponding computed invert elevation, pipe sizes, directions, structure cover type, complete culvert information, etc.

- Drainage Report.

- Legible copies of the plans for all utilities located within the limits of this project, and a list of all utilities with installations within the project area, noting utility name, address, phone number and contact person.

In the sixth pocket (Miscellaneous):

- Field books - numbered and marked with CS, JN, date

- Miscellaneous documents such as newspaper articles, general correspondence.

- Any reports or materials pertinent to the project survey not included in the other sections of the portfolio.

It is the responsibility of the consultant to insure that all electronic files submitted to MDOT conform to the required format, and that all documents are legible.

The consultant must organize and label the various sections of the portfolio as required by the Standards of Practice for MDOT Design Surveys dated April 1, 1998.

ATTACHMENT "A"

Mandatory ASCII format for control point, alignment point, and government corner witness lists, and benchmark list.

1. Files must be generated exclusively in ASCII Text format, in a program such as Notepad or Wordpad. Conversions from Rich Text Format, WordPerfect, etc. are not acceptable.

2. Do not use TABS to space text. Use spaces only.

3. Use normal keyboard keys for fractions. (Ex: 1/2")

4. For special characters use only the following MDOT Design Font Zero keyboard keys.

5. Data must be organized as shown in the example below:

CONTROL PT#: CP660
DESCRIPTION: Set .5/8"x 3ft rebar and yellow S&W cap in south edge of M-95 gravel shoulder, and 150 ft Eeast of Boilermaker Dr. to south.

Station 4+738.271, Offset 6.900ft Right

COORDINATES: N - 124677.7232 E - 4033287.8125 Elev - 272.145 ft

WITNESSES:
1. NORTH 6.844ft of E-W Edge of Metal of M-65
2. SOUTH 1.838ft North edge of concrete base of "West Lafayette City Limits" sign
3. S84^W 47.811ft Set nail & S&W tag in north face of power pole
4. S43^E 13.356ft Set nail & S&W tag in S.W. face of 24in White Maple

6. Data must be able to be imported directly into MicroStation, while retaining basic structure and showing proper symbols such as degree and centerline.

7. Prior to importing text files into MicroStation the font must be set to 0, Height must be set to 3, Width must be set to 2.4, and Line Spacing must be set 1.8 in the MicroStation-Element- Text Dialog Box. Also, in the same Dialog Box, single line and multi-line justification is to be set to Left.

ATTACHMENT "B"

Point to be displayed by Cell only.

# ANC	Cell	# CEM	Cell	# GYP	Cell
# HYD	Cell	# LBASE	Cell	# LP	Cell
# MB	Cell	# MRSH	Cell	# NWLK	Cell
# PH	Cell	# PLP	Cell	# POLE	Cell
# POST	Cell	# PP	Cell	# PTWR	Cell
# RIP	Cell	# RRSG	Cell	# RRSW	Cell
# SGN	Cell	# SIG	Cell	# TPED	Cell
# CATV	Cell	# PED	Cell		

Points by Cell and Description

# AZM	Cell, Desc	# BFR	Cell, Desc	# BSH	Cell, Desc
# CP	Cell, Desc	# CTRS	Cell, Desc	# ETB	Cell, Desc
# FLAG	Cell, Desc	# GFP	Cell, Desc	# GLM	Cell, Desc
# GPMP	Cell, Desc	# GPS	Cell, Desc	# GTU	Cell, Desc
# MBOX	Cell, Desc	# MEAN	Cell, Desc	# MISC	Cell, Desc
# NGS	Cell, Desc	# PIN	Cell, Desc	# PINE	Cell, Desc
# PIPE	Cell, Desc	# PK	Cell, Desc	# PLAT	Cell, Desc
# PROP	Cell, Desc	# QCOR	Cell, Desc	# QQCOR	Cell, Desc
# RM	Cell, Desc	# ROC	Cell, Desc	# RW	Cell, Desc
# SCOR	Cell, Desc	# SD	Cell, Desc	# SPKHD	Cell, Desc
# STA	Cell, Desc	# STMP	Cell, Desc	# TP	Cell, Desc
# TR	Cell, Desc	# TRAV	Cell, Desc	# TREE	Cell, Desc
# TSTHL	Cell, Desc	# USGS	Cell, Desc	# WEIR	Cell, Desc
# WIT	Cell, Desc	# WITPT	Cell, Desc		
# BCM	Cell, Desc				

Points by Cell and Elevation

# CB	Cell, Elev	# ELHH	Cell, Elev	# ELMH	Cell, Elev
# GVLV	Cell, Elev	# GWEL	Cell, Elev	# HI	Cell, Elev
# MH	Cell, Elev	# TMH	Cell, Elev	# SMH	Cell, Elev
# STMH	Cell, Elev	# UMH	Cell, Elev	# WSO	Cell, Elev
# WV	Cell, Elev	# WWEL	Cell, Elev		

Points by Description and Elevation

# CV	Desc, Elev.	# CMP	Desc, Elev.	# CPP	Desc, Elev.
# RCP	Desc, Elev.				

Points by Cell, Description and Elevation.

# BM	Cell, Desc, Elev.	# FL	Cell, Desc, Elev.
# HVCP	Cell, Desc, Elev.	# LO	Cell, Desc, Elev.
# RFPT	Cell, Desc, Elev.	# VCP	Cell, Desc, Elev.
# WELL	Cell, Desc, Elev.		

Survey Chains All of the following chains should be displayed in the final Drawing File:

ABUT	DCH	GR	POND	SS
BC	DECK	GRG	PROP	STM
BEAM	DIKE	GUT	RCP	STR
BLD	EB	H2O	REFL	STRM
BRL	EC	HDG	RIP	SW
BRR	EG	HSE	RIV	TELO
CDR	ELO	HWAL	ROC	TELU
CL	ELU	LAKE	RR	WEIR
CLB	EM	MRSH	RTWL	WWAL
CLV	EW	NOIS	SAN	
CMP	EWL	OCHD	SCL	
CP	FNC	OIL	SHBL	
CRK	FOP	PATH	SHLD	
CTV	FTG	PIER	SNLI	
DAM	GAS	PLAT	SPL	

ATTACHMENT "C"

ROAD

TEXT SIZES AND PLOTTING SCALES

WORKING UNITS:

MASTER UNITS	1 FT
SUB UNITS	1000 TH
POSITIONAL UNITS	1

WORKING AREA	4294967 SQ/FT
WORKING DIVISION	1000 TH/FT
ACCURACY	1 PU/TH

PROPOSED TEXT	HEIGHT	WIDTH LINE	SPACING
40 SCALE	4.8	4	3.2
50 SCALE	6	5	4
100 SCALE	12	10	8
EXISTING TEXT			
40 SCALE	3.2	2.4	1.6
50 SCALE	4	3	2
100 SCALE	8	6	4

Line weight = 0 for existing features

BRIDGE

TEXT SIZES AND PLOTTING SCALES

WORKING UNITS:

Master Units	1 FT
Per Master Unit	1000 TH
Positional Units	1

WORKING AREA	4294967 SQ/FT
WORKING DIVISION	1000 TH/FT
ACCURACY	1 PU/TH

PROPOSED TEXT	HEIGHT	WIDTH LINE	SPACING
40 SCALE	4.8	4	3.2
50 SCALE	6	5	4
100 SCALE	12	10	8
EXISTING TEXT			
40 SCALE	3.2	2.4	1.6
50 SCALE	4	3	2
100 SCALE	8	6	4

Line weight = 0 for existing features

ATTACHMENT "D"

RECOMMENDED COLORS FOR MICROSTATION PROJECTS

1. AS A MINIMUM, DESIGNERS SHOULD MAINTAIN THE COLOR SCHEME THROUGHOUT A PROJECT, WHETHER IT IS BY LEVELS AND/OR BY UTILITIES, ETC.

2. UNTIL MDOT CONVERTS TO COLOR REPRODUCTION METHODS, DESIGNERS SHOULD LAUNCH BLACK AND WHITE PLOTS FOR MASS REPRODUCTION PURPOSES.

3. THE FOLLOWING IS A RECOMMENDED COLOR SCHEME FOR DESIGNERS TO USE, AS A MINIMUM, TO HELP DISTINGUISH VARIOUS LEVELS, UTILITIES, ETC. ON MORE CONGESTED TYPE PROJECTS.

COLOR	LINE OR SYMBOL
RED (CO=3)	EX STORM SEWER, H.H., C.B. OR INLET TELEPHONE OR T.M.H. POWER CABLE, N.H. & ELEC H.H. DRAIN TILE OR PIPE LIGHT POST OR FLOOD LIGHT R.R. OR TRAFFIC SIGNAL POLICE OR FIRE CALL BOX CAUTION-CRITICAL NOTES/BOXES EXISTING BRIDGE LINES EX. PAVT., SIDEWALK, CURB & GUTTER, DRIVEWAYS GAS LINE, N.H. OR VALVE OIL PIPELINES GAS CAP, STOP VALVE OR DRIP
PURPLE (CO=5)	PROPERTY LINES, ROW PERMIT BOXES & NOTES, ROW LINES, PROPERTY OWNERSHIP ARROWS
BLUE (CO=1)	WATERLINE, M.H. OR VALVE FIRE HYDRANT WATER CAP OR METER STREAMS, LAKES, DRAINAGE COURSE, SPRINGS OR PONDS STEAM LINE OR VALVE EX. CONC BOX OR SLAB CULVERT EX. PIPE CULVERT
GREEN (C0=2)	EX SANITARY SEWER AND N.H. HEDGE FENCES, TREES, BRUSH AND WOODS, CONTOUR LINES, SWAMPS OR MARSH
WHITE PLOTS BLACK (CO=O)	PROPOSED PAVEMENT LINES PROPOSED BOX OR SLAB CULVERTS PROPOSED DRAINAGE STRUCTURES & SEWERS SURVEY CENTERLINE, CONSTRUCTION CENTERLINE TYPE OF SOIL (MIAMI SERIES ETC.) POWER TRANSMISSION LINE FIBER OPTICS, CABLE TV

NOTE: THE COLOR YELLOW CAN BE USED AS A GOOD SUBSTITUTE FOR SCREEN PURPOSES, BUT IT DOES NOT PLOT WELL WITH CURRENT PLOTTERS

ATTACHMENT "E"

ROAD DESIGN LEVELS

LEVEL 1 THRU 20 ARE FOR SHEET SET-UP AND TOPO

1	SHEET LAYOUT, NORTH ARROW
2	CONTROL POINTS, BENCHMARKS, GOVERNMENT CORNER, Right-of-Way, AND ALIGNMENT WITNESS (CONTINUOUS PROFILE SHEETS)
3	PLAN REVISION BOX (GRID ON SINGLE PROFILE SHEETS)
4	GRID (CONTINUOUS PROFILE SHEETS)
5	STATION ELEVATIONS (SINGLE PROFILE SHEETS)
6	STATION ELEVATIONS (CONTINUOUS PROFILE SHEETS)
7	TRAVERSE AND BASE LINES, LEFT SIDE ELEVATIONS (SINGLE PROF SHEETS)
8	SOIL SERIES INFO, BORING LOCATIONS, LEFT SIDE ELEVATIONS (CONTINUOUS PROFILE SHEETS)
9	SURVEY CENTERLINE, ALIGNMENT, LABELING
10	PATH AND TRAIL POINTS AND LINES
11	EXISTING EDGE OF PAVEMENT, EXISTING ABUTMENTS, CONCRETE BARRIER, ETC.
12	BUILDINGS, HOUSES, GARAGES
13	EXISTING FENCE LINES, RAILROADS, AIRPORTS, SIGNS, GUARDRAIL, ETC.
14	SIDEWALKS, DRIVES, TWO TRACKS
15	BELOW GROUND UTILITIES--GAS, WATER, ELECTRIC, TELE, LABELING, ETC.
16	ABOVE GROUND UTILITIES--POLES, TRANSMISSION LINES, LABELING, ETC.
17	EXISTING STORM AND SANITARY SEWERS, CATCH BASINS, MANHOLES
18	TREE, SHRUB, HEDGE, AND BRUSH LINES, AND SINGLE TREES
19	EXISTING CULVERTS, DRAINAGE COURSES, NATURAL WATER & WELLS, ETC.
20	CONTOUR LINES

21 THRU 49 ARE ROAD DESIGN LEVELS

21	PROPOSED ALIGNMENTS, TIES, LABELING
22	PROPOSED PC'S, P.T.'S, PI'S, TANGENTS & CURVE DATA
23	OPEN
24	SECTION CORNERS, GOVERNMENT LINES W/TIES (TWP/RANGE)
25	EXISTING R.O.W., ROAD NAMES, CITY LIMITS, SUBDIVISION PLAT NAMES
26	PROPOSED PAVEMENT, BRIDGES, RETAINING WALLS, GUARD RAIL, CURB, GUTTER, SIDEWALK, DRIVEWAYS
27	PROPOSED RIGHT-OF-WAYS, LABELING, TIES, PERMITS
28	OPEN
29	REMOVAL ITEMS
30	PROPOSED DRAINAGE
31	PROPOSED SLOPE STAKE LINES
32	PROPOSED ELECTRIC
33	CONSTRUCTION NOTES (DRAINAGE & QUANTITIES)
34	PROPOSED WATER MAINS, WATER MAIN NOTES
35	PROPOSED ELECTRIC NOTES
36	MAINTAINING TRAFFIC
37	OPEN
38	CONSTRUCTION CHANGES & ALTERNATE ALIGNMENTS
39	SCRATCH LEVEL FOR WATER MAIN CHANGES
40	SCRATCH LEVEL FOR ELECTRIC CHANGES
41	PROFILE SHEET A - EXISTING GROUND

42 PROFILE SHEET B - EXISTING GROUND
43 PROFILE SHEET A - PROPOSED WORK
44 PROFILE SHEET B - PROPOSED WORK
45 BRACKETS & ELEVATIONS RIGHT SIDE (SINGLE PROFILE SHEETS)
46 BRACKETS & ELEVATIONS RIGHT SIDE (CONTINUOUS PROFILE SHEETS)
47 LANDSCAPING
48 OPEN
49 WETLAND CONTOURS, SIGNING

50 THRU 55 ARE FOR REAL ESTATE INFORMATION

50 PARCEL LINES, PARCEL NUMBERS, OWNERSHIP ARROWS
51 LOT LINES AND NUMBERS
52 PROPERTY CORNER INFORMATION
53 SPECIAL ROW NOTES AND DIMENSIONS
54 SPECIAL ROW NOTES AND DIMENSIONS
55 SPECIAL ROW NOTES AND DIMENSIONS

LEVELS 56 THRU 58 AND 63 ARE OPEN

59 HYDRO CHAINS AND POINTS
60 MISC AND REFERENCE LINES, ETC.
61 PLAT AND PROPERTY LINES AND POINTS
62 DTM BREAKLINES, DTM AND XYZ POINTS

ATTACHMENT "F"
MDOT FEATURE CODES

Feature (LINES)	Description	DTM (Y/N)
ABUT	BRIDGE ABUTMENT	Y
BB	BOTTOM OF BANK	Y
BC	BACK OF CURB	Y
BDR	BIT DRIVE	Y
BEAM	BEAM	N
BIKE	BIKEWAY/PATH	Y
BLD	BUILDING	Y
BLOT	BIT LOT	Y
BRL	BRUSH LINE	N
BRR	CONCRETE BARRIER	Y
CC	CURB CUT	Y
CDR	CONCRETE DRIVE	Y
CEM	CEMETERY	N
CLB	CENTER LINE (BRIDGE)	Y/N
CL	CENTER LINE (GENERIC)	Y
CLOT	CONCRETE LOT	Y
CLV	CULVERT (GENERIC)	N
CMP	CORR METAL PIPE	N
CP	TRAVERSE CTL LINE	N
CRK	CREEK CL	Y
CTV	CABLE TV (UG)	N
DAM	DAM	Y
DCH	DITCH CENTERLINE	Y
DECK	BRIDGE DECK	Y/N
DIKE	DIKE	Y
DLOT	DIRT LOT	Y
DRV	SURFACED DRIVE	Y
EB	EDGE OF BITUMINOUS	Y
EC	EDGE OF CONCRETE	Y
EG	EDGE OF GRAVEL	Y
ELO	ELEC LINE OVERHEAD	N
ELU	ELECTRIC LINE (UG)	N
EM	EDGE OF METAL	Y
EP	EDGE OF PAVEMENT	Y
EW	EDGE OF WATER	Y
EWL	EDGE WETLAND	Y
FNC	FENCE LINE	N
FOP	FIBER OPTIC CABLE	N
FTG	FOOTING	N
GAS	GAS LINE (NATURAL)	N
GDR	GRAVEL DRIVE	Y
GLOT	GRAVEL LOT	Y
GR	GUARDRAIL	N
GRG	GARAGE	Y
GUT	GUTTER FLOW LINE	Y
H20	(UG) WATERMAIN	N
HDG	HEDGE LINE	N
HSE	HOUSE	Y
HWAL	HEADWALL	Y
LAKE	LAKE	Y
LL	LANE LINE	Y

Feature (LINES)	Description	DTM (Y/N)
MISC LINE	MISCELLANEOUS	N
MRSH	MARSH LINE	Y
NOIS WALL	NOISE BARRIER	Y
OCHD	ORCHARD	N
OIL	PIPE LINE (OIL)	N
PATH	PATH	Y
PIER	PIER	N
POND	POND	Y
PLAT	PLAT BOUNDARY	N
PROP	PROPERTY LINE	N
PVT	SURFACED ROADS	Y
RBOT	RIVER BOTTOM	Y
RCP	RNFC CONCRETE PIPE	N
RDG	RIDGE/BREAK LINE	Y
REFL	REFERENCE LINE	N
RIP	RIPRAP	Y
RIV	RIVER CENTERLINE	Y
ROC	ROCK OUTCROPPING	Y
RR	RAILROAD TRACKS	Y
RTWL	RETAINING WALL	Y
SAN	SAN SEWER LINE	N
SCL LINE	SURVEY CENTER	Y
SHBL	SHRUB LINE	N
SHLD	SHOULDER	Y
SLAB	CONCRETE SLAB	Y
SNLI	SIGN/BILLBOARD	N
SPL	SPILLWAY	Y
SS	STORM SEWER LINE	Y
STM	STEAMLINE (UG)	N
STRM	STREAM CENTERLINE	Y
STR	STRUCTURE	Y/N
SW	SIDEWALK	Y
TB	TOP OF BANK	Y
TELO	TELEPHONE (OVHD)	N
TELU	TELEPHONE (UG)	N
TGRPH	TELEGRAPH (UG)	N
TREL	TREE LINE	N
TRL	TRAIL	Y
WEIR	WEIR	Y
WWAL	WING WALL	Y

Feature (POINTS)	Description	DTM (Y/N)
ALI	ALIGNMENT PT	Y
ANC	DEADMAN	Y
AZM	AZIMUTH MARK	N
BFR	BIG ROCK	Y
BSH	BUSH	Y
CB	CATCH BASIN	Y
CEM	CEMETERY	Y
CP	TRAVERSE POINT	N
CTRS	CENTER SECTION CORNER (PLS)	N
ELHH	ELEC HANDHOLE	Y
ELMH	ELEC MANHOLE	Y
ETB	ELEC TRANS BOX	N
FCOR	FENCE CORNER	Y
FL	FLOW LINE	Y
FLAG	FLAG POLE	Y
GFP	GAS FILLER PIPE	N
GLM	GASLINE MARKER	Y
GPMP	GAS PUMPS	N
GPS	GPS MONUMENT	N
GVLV	GAS VALVE	Y
GTU	GAS TANK (UNDGND)	Y
GWEL	GAS WELL	Y
GYP	GUY POLE	Y
GYW	GUY (DEADMAN)	Y
HI	HIGH POINTS	Y
HVCP	PHOTO TARGET	N
HYD	FIRE HYDRANT	N
LBASE	LIGHT BASE	N
LBOT	LAKE BOTTOM (PNT)	Y
LO	LOW POINTS	Y
LP	LIGHT POLE	Y
MB	MAILBOX	Y
MBOX	MONUMENT BOX	Y
MEAN	MEANDER COR (PLS)	N
MISC	MISC POINT	N
MH	MANHOLE	Y
NGS	NGS MONUMENT	N
NWLK	WALK-NOWALK SIGN	N
OWEL	OIL WELL	Y
PK	PK NAIL	Y
PH	TELEPHONE OR CALLBOX	Y
PIN	IRON PIN	N
PINE	CONIFER TREE	Y
PIPE	IRON PIPE	N
PLAT	PLAT CORNER	N
PLP	POWER LIGHT POLE	Y
POLE	UTILITY POLE (GENERIC)	Y
POST	POST (GENERIC)	Y
PP	POWER POLE	Y
PROP	PROPERTY CORNER	N
PTWR	POWER TOWER	Y
QCOR	QUARTER SECTION CORNER (PLS)	N

Feature (POINTS)	Description	DTM (Y/N)
ALI	ALIGNMENT PT	
QQCOR	SIXTEENTH CORNER (PLS)	N
RBOT	RIVER BOTTOM (PT)	Y
RFPT	REFERENCE PT	Y
RM	REFERENCE MARK	N
RRSG	RR SIGNAL	Y
RRSW	RR SWITCH BOX	Y
RW	ROW MARKER	Y
SMH	SANITARY MH	Y
SCOR	SECTION CORNER (PLS)	N
SD	SATTELITE DISH	N
SGN	SIGN POST	Y
SIG	TRAFFIC SIGNAL	Y
SPKHD	SPRINKLKER HEAD	Y
STA	SURVEY STATION	N
STMH	STORM MH	Y
STMP	STUMP	Y
TMH	TELEPHONE MH	Y
TP	TELEPHONE POLE	Y
TPED	TELEPHONE PED	Y
TR	TRAVERSE/TP POINT	N
TREE	DECIDUOUS TREE	Y
TSTHL	TEST HOLE	Y
UMH	UTIL MH (GENERIC)	Y
USGS	USGS MON	N
VCP	VERT TARGET	N
WELL	WELL (GENERIC)	Y
WIT	WITNESS SEC CORNER (PLS)	N
WSO	WATER SHUT-OFF	Y
WV	WATER VALVE IN MANHOLE	Y
WWEL	WATER WELL	Y
XYZ	RANDOM SHOT (SPOT ELEV)	Y

ATTACHMENT "G"

MDOT QA/QC Certification Check List

The purpose of this checklist is to insure that critical items are checked prior to submitting the project for review and acceptance. The proper use of this document should drastically reduce the amount of time spent by MDOT and Consultant personnel correcting oversights and omissions from the project. The last page of this list is to be used to provide a brief explanation of why an item is being omitted. If a particular item is not applicable simply check NA, no explanation is necessary. Failure to complete and include this list with the final project portfolio will result in the immediate return of the portfolio for completion.

NOTE: Be sure that the latest CAiCE files and Tugboat from the MDOT FTP site are utilized.

X	NA	
		Portfolio:
____	____	Two complete sets of survey data have been compiled for delivery.
____	____	Portfolio labeled as per Scope.
		Portfolio Pocket Contents:
		Administrative
____	____	The MDOT Survey Contact is _____ _____.
____	____	MDOT QA/QC Certification Check List
____	____	MDOT transmittal form 222
____	____	Comprehensive project survey report. Also, include a synopsis of the report that pertains to that section in the front of each pocket.
____	____	MDOT authorization letter
____	____	Copy of scope of work
____	____	Copy of proposed work schedule
____	____	All correspondence (change of scope, change of schedule, phone records etc.)
____	____	All digital Project files archived with subdirectories matching each portfolio pocket on Compact Disc (CD) including: CAiCE archive (.zip), MicroStation drawing file (.DGN)
____	____	All required ASCII files or Microsoft Word documents.
		Control:
____	____	Control point List with: Datum __, Description __, Coordinates with Std. Err. __, station offsets __, Scale Factors __, witnesses __.
____	____	Bench Mark List with: Datum __, Descriptions __, Elevations __, station offsets __.
____	____	G.P.S./traverse adjusted coordinates with standard errors
____	____	Horizontal and Vertical Least Squares Adjustments

____ ____ Level adjustment report, showing to the hundredth of a foot,
___ 0.06ft error per Mi
___ 0.04ft error per Mi

____ ____ Sketch or plot of network or traverse

____ ____ NGS or MDOT data sheets of existing control

____ ____ DDPROC .ha files printout, or copy of Mark Recovery Form submitted on the NGS website

Alignment:

____ ____ A sketch or CADD drawing of the alignment with:
stationing __, horizontal coordinates __, curve data __, alignment points found or set __, source of stationing __.

____ ____ Control sketch with control points, government corners and alignment plotted.

____ ____ A report discussing in detail the type of alignment, source of the stationing and how it was determined.

____ ____ Alignment point list with:
Datum __, Description __, Station __, Coords.__, Witnesses __.

Property:

____ ____ Recorded copies of all LCRCs required for the project.

____ ____ Government Corner list with:
Datum __, Corner names__, Coordinates and 4 witnesses __, Indication of which corners are in danger of destruction __.

____ ____ Section Corner ties to the alignment with station, distance and bearing along the section line.

____ ____ Section map with bearings, distances between Government corners.

____ ____ Copy of submittals to county Remonumentation (if required)

____ ____ Copies of all research documents, tax maps, tax descriptions, deeds, recorded plats, surveys, etc.

____ ____ A separate plot of alignment or tax map showing all property irons found, with point numbers.

____ ____ A station offset listing of property irons.

Mapping:

____ ____ A legible planimetric plot, including:
contours __, MDOT Cells symbology __,
Centerline alignment shown __.

____ ____ A second plot showing all surface materials, utility connectivity and other pertinent notes or comments.

____ ____ All plots certified as per scope.
____ ____ All field survey notes obtained for this project.
____ ____ Drainage structure inventory is:
correlated to the structures shown on the plot __, includes all pertinent data about the structures: Station and offset __, coordinates __, structure name __, rim elevations __, invert depths with corresponding computed invert elevation__, pipe sizes __, directions __, structure cover type __, culvert size, material, condition __, headwall or end section desc. __.

____ ____ Drainage Report.
____ ____ A list of all utilities noting utility name, address, phone number and contact person.

____ ____ Station Offset report for each utility feature.

____ ____ As-Built plans from each utility.

Miscellaneous:

____ ____ Miscellaneous Information Included

____ ____ Photographs

Bridge Specific Information:

____ ____ Sketch of structure* in elevation view including:
Ref. Line to Ref. Line Dimensions___, Ref. Pt. Elevs.___,Ref Pt. Stations___, Underclearance Elev.___, Abutment, bridge seat and Pier cap Elev.___, Ftg. Elev. (if requested)___, face to face abutment and pier dimensions____, top of Water elev.____, stream bed elevs.____, lower roadway elevs.____.

____ ____ Sketch of structure* in Plan View including:
Ref. Pt. Elevs.___, Ref Pt. Stations___, Ref Pt. Coordinates___, Alignment___, Angle of Crossing___, Deck dimensions___, Abutment and Pier cap dimensions___.

____ ____ Explanation of how reference point locations were determined.

* If plans are available this information may be shown on existing plan sheets.

C<u>AiCE File:</u>

____	____		Project Name is MDOT Job Number #####
____	____		CAiCE Project Description field is filled out
____	____		Correct Units (International Feet) selected in System Settings
____	____		Correct Datum Selected in System Settings
____	____		Z Coordinate value set to 4.2 in System Settings
____	____		Correct MDOT Feature Table Attached prior to Data importation
____	____		Correct MDOT Cell Library Attached prior to Data importation
____	____		Only MDOT Feature Codes Used
____	____		All points have appropriate Descriptions
____	____		Desired plot scale checked with designer
____	____		All survey chains edited and properly connected prior to DTM creation.
____	____		All survey chain crossings resolved.
____	____		All survey chain curves checked for correctness and aesthetics.
____	____		No survey chain curves are shown as chords.
____	____		Survey chain Patterns checked for proper direction (guardrail, railroad, treeline, etc)
____	____		Hydro survey chains checked for correct left to right direction.
____	____		Single DTM Surface is named EX (multiple surfaces = EX1, EX2, etc.)
____	____		DTM checked for invalid breaklines
____	____		DTM checked for invalid point data (spikes/holes)
____	____		DTM triangles checked for spikes and dips
____	____		Long or invalid triangles have been obscured from TIN
____	____		Bridge decks and data suspended above natural terrain/substructures have been removed from the terrain surface prior to triangulation.
____	____		Terrain surface beneath bridge decks is included in DTM
____	____		Underwater areas have been removed from terrain surface prior to triangulation
____	____	*	Text size is dependent on the scale _X_ 100 scale, text size = 9.0 ___ 50 scale, text size = 4.5 ___ 40 scale, text size = 3.6
____	____	*	Cell Scale set to: ____ 1.0 (1":100'), ____0.5 (1": 50'), ___0.4 (1": 40')
____	____	*	Contour Interval set to 2 in DTM Settings
____	____	*	Max. Offset for contour smoothing set to 1 in DTM Settings.

<u>Contour Object Display Settings:</u>

____	____	*	Contour interval set to 2 regular and 10 index .
____	____	*	All contour colors set to 5, Index set to 2
____	____	*	Line weights set to 0 regular, 1 Index
____	____	*	All contour levels set to 20
____	____	*	Index Label spacing set to 60, color set to 5
____	____	*	Character height is dependent on the scale; ____ 100 scale, character height = 9.0 ____ 50 scale, character height = 4.5 ____ 40 scale, character height = 3.6
____	____	*	Label Depression Contours unchecked
____	____	*	Final contours computed after DTM edits and settings checked

Display:

____ ____ * Scale and text size checked prior to display
____ ____ * Survey Chains displayed as per Attachment >AA=
____ ____ * Survey Points displayed as per Attachment >AA=
____ ____ * Alignment geometry chain Feature Code is SCL
____ ____ * Alignment geometry chain is displayed
____ ____ * Contours are displayed
____ ____ * Point descriptions displayed as per Attachment >AA= and scope
____ ____ * All overlapping text has been clearly resolved (if requested in scope)
____ ____ * All subsurface drainage can be correlated with inventory sheets.
____ ____ * CAiCE drawing file created and named Job # +pl.cdg (#####cpl.cdg)
____ ____ * Correct seed file selected for MicroStation file conversion

	DATUM		SEED FILE
___	Assumed	___	MiDOT2d.dgn
___	**SPC83 South**	___	Seedfs.dgn
___	SPC83 Central	___	Seedfc.dgn
___	SPC83 North	___	Seedfn.dgn

____ ____ * Correct cell file selected for MicroStation file conversion (midote_02.cel)
____ ____ * 2d MicroStation file created and named Job # +pl.dgn (#####cpl.dgn)
____ ____ MicroStation file of Bridge structures created with Contours (Plan of Site)
____ ____ * Geopak files generated from the MDOT Plans Production tugboat/macro. ____ 3d MicroStation DGN triangle file, ____Survey Chain (TIN Boundary) around edited triangle file with the name and feature "CLIP",
____ _____ * Job #.OBS and Job #.XYZ files (can only be generated from tugboat)
____ ____ CAiCE archive file named (Job#####.zip)
____ ____ Project portfolio labeled and includes data as per scope.
____ ____ Used MDOT's Plans Production tugboat/macro.

Many of the asterisk items can be easily completed in CAiCE using the CAiCE tugboat/macro AMDOT Plans Production@. Contact you project consultant for information about this CAiCE tugboat.

Digital Files:

____ ____ All Project files and CAICE archive recorded on a Compact Disc named the same as the job number (#####.zip) and all files under the appropriate directory headings:

ADMINISTRATION__, CONTROL__, ALIGNMENT__, PROPERTY__, MAPPING__, MISCELLANEOUS__.

____ ____ Project Survey Report

____ ____ Control Point coordinates report (ASCII) with standard deviations

____ ____ Control Point least squares adjustment statistical report (ASCII) showing Reference Factors and weighting strategies

___ ____ Control point list (ASCII) with:
Datum __, Description __, Coordinates with Std. Err. __, station offsets __, Scale Factors __, witnesses __.

____ ____ DDPROC - .ha files for stations recovered and used as horizontal or vertical control

____ ____ MicroStation file named job# +pl.dgn

____ ____ Benchmark level loop - least squares adjustment report (ASCII)
All level loops should be in one adjustment run if at all possible.

____ ____ Bench Mark List (ASCII) with:
Datum __, Descriptions __, Elevations __, station offsets __.

____ ____ Describe Alignment Chain(s) (ASCII) from CAiCE
Coordinates__, Bearings__, Distances__, Curve data__, Stationing__.

____ ____ Alignment point list (ASCII) with:
Datum __, Description __, Station __, Coords.__, Witnesses __.

____ ____ Government Corner list (ASCII) with:
Datum __, Corner names__, Coordinates and 4 witnesses __, Indication of which corners are in danger of destruction __.

____ ____ Property Corner report (ASCII) with
Coordinates__, Station-offset__, Description__, Feature code__, Alignment name__.

____ ____ INDIVIDUAL UTILITY REPORTS (ASCII) for each utility with:
Designation__, Coordinates__, Elevation__, Description__, Feature Code __, Station-offset__.

____ ____ Utility Owner listing (ASCII) with:
Name of Utility__, Address__, Phone number__, Contact Person__.

____ ____ Drainage structure report (ASCII or a spreadsheet compatible with MDOT software) of manholes and catch basins with:
Designation__, Coordinates__, Elevation__, Description__, Feature Code__, Station- offset__, Invert and Pipe Dimension information__, Structure condition__.

____ ____ Culvert Structure report (ASCII or a spreadsheet compatible with MDOT software) with:

		Designation__, Coordinates__, Elevation__, Station-offset__, Size and Material__.
____	____	Digital or scanned photographs.
____	____	**CAiCE fully edited archived file with DTM (.zip)**
____	____	All paper pages in the portfolio must be scanned into either a PDF or TIF format file even if already existing in electronic form.
____	____	Create one .DGN file with the Control point list, Benchmark list, Alignment point list, and Government Corner list per Attachment ASC.
____	____	Scope has been reviewed to insure compliance.

I have reviewed the survey notes and scope of work and certify that all required and requested information is present in the portfolio in compliance with the MDOT Survey Standards of Practice, the survey scope of work and this QA/QC Check List. Any information omitted from this submission has been explained on the sheet attached.

_____ _____

SEAL Professional Surveyor #

Explanation of Omissions